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Cardiothoracic Imaging

Asymptomatic novel coronavirus pneumonia patient outside Wuhan: The value of CT images in the course of the disease

Chen Lin^{a,b,c,*}, Yuxiao Ding^{a,b}, Bin Xie^{a,b}, Zhujiang Sun^{a,b}, Xiaogang Li^{b,d}, Zixian Chen^e, Meng Niu^e^a Department of Radiology, Lanzhou Lung Hospital, Lanzhou 730000, People's Republic of China^b Gansu Provincial Infectious Disease Hospital, Lanzhou 730000, People's Republic of China^c The First Clinical Medical College, Lanzhou University, Lanzhou 730000, People's Republic of China^d Department of Respiratory, Lanzhou Lung Hospital, Lanzhou 730000, People's Republic of China^e Department of Radiology, The First Hospital of Lanzhou University, Lanzhou 730000, People's Republic of China

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ABSTRACT

The purpose of this case report is to describe the imaging and associated clinical features of an asymptomatic novel coronavirus pneumonia (COVID-19) patient outside Wuhan, China. The principle findings are that in this patient with laboratory-confirmed COVID-19, CT findings preceded symptoms and included bilateral pleural effusions, previously not reported in association with COVID-19. The role of this case report is promotion of potential recognition amongst radiologists of this new disease, which has been declared a global health emergency by the World Health Organization (WHO).

1. Introduction

In Wuhan, China, in December 2019, a series of pneumonia cases of unknown etiology appeared, soon after diagnosed as being caused by a novel coronavirus initially titled 2019 novel coronavirus (2019-nCoV) and subsequently officially named COVID-19 by the WHO on February 11, 2020 [1].

As of February 14, 2020, there are 49,053 laboratory-confirmed cases globally [2], 15 of which are in the United States [3]. There is a small but growing body of literature regarding the imaging findings of COVID-19, and the purpose of this case report is to describe the imaging and associated clinical features of an asymptomatic COVID-19 patient outside Wuhan, China, including an imaging finding previously not reported.

2. Case report

A 61-year-old asymptomatic man was admitted to our hospital in Lanzhou, China (1005 miles from Wuhan) on January 25, 2020 for close contact with a novel coronavirus pneumonia (NCP) patient more than 10 days prior. The patient was a retired driver in good health, without diabetes, hypertension, cardiovascular disease and had no history of smoking. The patient's temperature and physical examination were normal. Laboratory analysis showed reduced levels of C-reactive

protein (1.29 mg/L; normal range, 2–8 mg/L), but white blood cells and lymphocytes were within normal range. The patient's throat swab was positive for NCP nucleic acid.

On the day of admission, high resolution CT (HRCT) showed multiple ground glass opacities (GGOs) in the right lung (Fig. 1A, B). Two days later, CT images revealed an enlarged lesion with small areas of consolidation in the center (Fig. 1C, D). On the sixth day, CT examination showed that the quantity, range and density of lesions in the right lung had increased further (Fig. 1E). On CT on the 9th day of admission, the lesions progressed further and involved both lungs, with thickened interlobular septa around the lesion in the upper lobe of the right lung (Fig. 1F, G); in addition, there were small bilateral pleural effusions (Fig. 1H).

Since admission, the patient has remained with only mild shortness of breath after activity on the 11th day of admission (February 4, 2020). He has not had fever, cough, myalgias, fatigue, sputum production, headache, hemoptysis or diarrhea. Notably, he has also remained without complications previously reported in association with COVID-19, including acute respiratory distress syndrome, RNAemia, acute cardiac injury, secondary infection. During the hospitalization, the main treatment has been oral antiviral drugs (Lopinavir and Ritonavir tablets), interferon and methylprednisolone. On the 23th day of admission (February 16, 2020), CT showed that the patient's pleural effusions had resolved and bilateral pulmonary lesions improved (Fig. 2A,

* Corresponding author at: Department of Radiology, Lanzhou Lung Hospital, No. 968, North Riverside Middle Road, Chengguan District, Lanzhou City, Gansu Province 730000, People's Republic of China.

E-mail address: 1204731562@qq.com (C. Lin).

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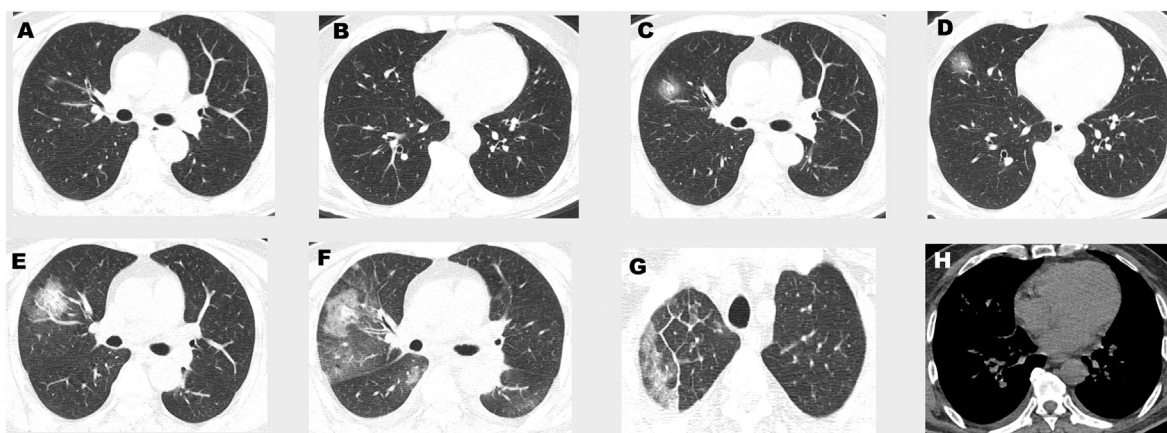


Fig. 1. Unenhanced CT images: A, B, Images shows ground glass opacities in right lung. C, D, Images obtained 2 days later shows progressive ground-glass opacities with small areas of consolidation in the center. E, On the sixth day, images show the quantity, range and density of lesions in the right lung increased further. F, G, H, Images obtained on the 9th day demonstrate that lesions progressed further and involved both lungs, with thickened interlobular septa around the lesion in the upper lobe of the right lung, and the appearance of small bilateral pleural effusions.

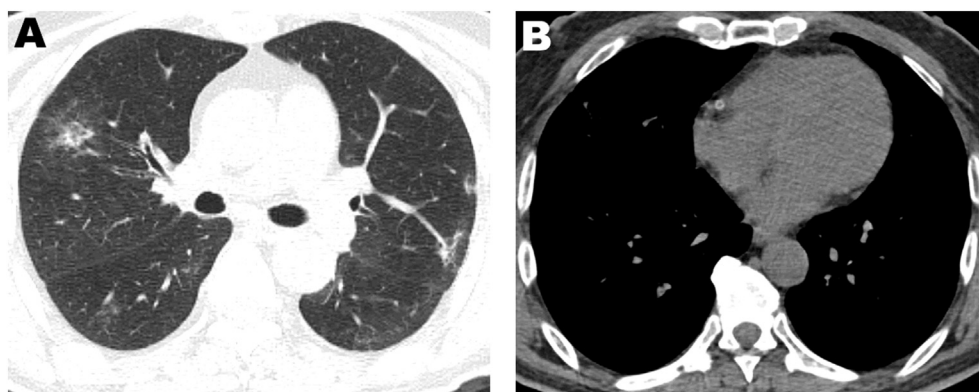


Fig. 2. Unenhanced CT images from the 23rd day of admission demonstrate: A, B, Resolution of bilateral pleural effusions and improvement of bilateral pulmonary lesions.

B), however the patient remains hospitalized because his nucleic acid test is still positive.

3. Discussion

The purpose of this case report is to describe the imaging and associated clinical features of an asymptomatic COVID-19 patient outside Wuhan, China.

The principle findings are that in this patient with laboratory-confirmed COVID-19, CT findings preceded symptoms and included bilateral pleural effusions, previously not reported in association with COVID-19.

There is a small but growing body of literature regarding the imaging findings of COVID-19 (11 articles in the English language literature in Pub Med on February 15, 2020 [4]), and the patient in this case report demonstrates both similarities and differences compared with the literature. Most noteworthy is that the COVID-19 patient in this case is the first reported, to the best of our knowledge, with associated bilateral pleural effusions. On the other hand, consistent with 98% of patients in the initial landmark Lancet article with a sample size of 41 [5], the imaging findings of this patient with laboratory-confirmed COVID-19 infection ultimately had bilateral pulmonary involvement. Yet in contrast to patients in the Lancet cohort for whom “Later chest CT images showed bilateral ground-glass opacity, whereas the consolidation had been resolved” [5], for the patient in this case report, earlier chest CT images showed ground glass opacities (GGOs) and later chest CT images showed progressive bilateral consolidation.

The COVID-19 patient in this report was also similar to a study from European Radiology with a sample size of 63 which demonstrated multilobar findings, GGOs and progression in the majority of patients [6]. The COVID-19 patient in this report showed similarity to a cohort of 21 patients reported in radiology as well, in which the lung abnormalities on chest CT in patients with COVID-19 showed greatest severity approximately 10 days after initial onset of symptoms [7]; in the patient in this case report, CT chest changes were greatest at day nine. In sum, emerging information seems to suggest that typical imaging findings of COVID-19 include GGO and/or mixed GGO and mixed consolidation [8]. This case report contributes to the growing literature on COVID-19 by reporting for the first time the associated finding of bilateral pleural effusions.

Limitations of this case report include the sample size ($n = 1$) and lack of some desired information, including sputum culture or analysis of pleural fluid. Despite these limitations, the goal in writing this case report is hopefully the education of radiologists and other clinicians of the recognition of this new disease [9] which has been declared a global health emergency by the WHO.

In conclusion, this patient with laboratory-confirmed COVID-19 infection demonstrates that abnormal CT findings can precede clinical symptoms and that these abnormal CT findings may include bilateral pleural effusions. Future series and studies should seek to assess if this is the case on a larger scale, as well as the association between viral clearance of COVID-19 on laboratory analysis and clearance on imaging. In patients whose exposure history and epidemiological history can be determined, the imaging manifestations, high resolution CT may

be helpful for the diagnosis and observation in the course of this unfortunately exponentially growing disease.

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Author's note

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Editor's note

Clinical Imaging extends its best wishes to the radiologists and other health care providers in China, as well as to the patients affected with COVID-19 – our thoughts are with you during this unbelievably difficult time.

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